GOES and Non-GOES Imagery Product Compression Approach for External NOAAPORT Satellite Broadcast Network Users

As part of an effort to achieve better utilization of satellite bandwidth and allow additional products to be broadcast, several changes will be made in the distribution of imagery products.

Beginning late summer 2003 the National Weather Service (NWS) will start this effort by first compressing all imagery products on the NOAAPORT SBN, and then combining the compressed GOES-EAST and GOES-WEST products onto a single GOES channel.

Imagery products are identified in the SBN header as product types of either GOES_EAST(1) or GOES_WEST(2) for GOES imagery and as NOAAPORT_OPT(3) for other non-GOES or composite imagery. Imagery products contain a WMO header (21 bytes) and a Product Definition Block (PDB), (512 bytes), as defined in the AWIPS/NESDIS Interface Control Document (ICD).

The current format of all imagery products as defined above is as follows:

- WMO header (TTAAII CCCC YYGGgg)
- Product Definition Block
- Product data

All imagery products will be compressed using the zlib frame-by-frame method currently employed for radar products. The zlib libraries and user documentation are available at the following zlib home page Web address:

http://www.gzip.org/zlib

Once the compression has been implemented, the CONUS imagery products currently being broadcast on both the GOES-EAST and the GOES-WEST channel will be combined and broadcast on a single GOES channel, the former GOES-EAST channel, within the existing 1.5 Mbps capacity. Additionally, all OCONUS GOES products for Alaska, Hawaii, and Puerto Rico sectors along with the existing non-GOES composite imagery will be broadcast on the 768 Kbps non-GOES imagery/DCP 4th channel.

The gzip compression scheme can achieve up to a 5-to-1 ratio on certain image products. However, the expected overall gain for the GOES imagery products using the zlib frame-by-frame compression approach is approximately 2 to 1. Therefore, a single T1 channel of 1.5 Mbps capacity should accommodate the existing suite of CONUS GOES imagery products with some additional broadcast delay times introduced during the overlapped GOES EAST and GOES WEST scan times.
Imagery products will be broadcast with a clear text WMO header preceding the compressed information to allow product identification without invoking the zlib decompression routine. In the first block, the same WMO header will be included within the compressed block. The preceding clear text WMO header can be discarded (or used as verification against the

compressed WMO header) once the product has been decompressed.

All imagery products will continue to be broadcast as HDLC frames that consist of one or multiple scan lines. Therefore, blank lines of the appropriate length can be substituted for missing frames to restore the decompressed image to its proper overall size.

As with the radar products, each frame will contain a flag bit that indicates compression has been applied to this frame. If the compressed version of a frame exceeds the maximum SBN frame size of 5,120 bytes of data, that individual frame will be left uncompressed. Therefore, it is incumbent upon the designer of a NOAAPORT Receive System to verify that each frame of the product actually has been compressed by examining the frame compress flag indicator bit. A simple call to the zlib decompress library routine for each compressed frame will produce an individual decompressed frame. Since this compression algorithm is lossless, there is no loss of product information when converting from the transmitted compressed format back to the original decompressed format.

Note that any text product messages (e.g., an administrative message) transmitted on the GOES channel or non-GOES imagery/DCP 4th channel will not be compressed.

SBN Imagery Product Format Definition

The format of the data fields of an SBN compressed imagery product will be as follows:

Frame #0

****
Clear Text Data (WMO Header only)
- original WMO header (TTAAII CCCC YYGGgg)

Compressed Data
- WMO header (TTAAII CCCC YYGGgg)
- Product Definition Block
****

Frame #1 - #n

****
Compressed Data
- product data block (1 or more image scan lines)
****
SBN Product-Definition Header

- Transfer type (flag bit in 2nd octet of Product-Definition Header)
x10 - Frame is compressed via zlib library

- Data block offset (7th & 8th octet of Product-Definition Header)

- offset in bytes to compressed portion of data (from beginning of this SBN data frame), i.e., length of clear text header (only applicable to first frame of a compressed product)